REMARKS

Claims 9-28 are pending, with claims 9 and 15 being independent. Claims 21-28 have been added. Support for the new claims can be found in the specification, at least at page 1, lines 9-12; page 3, line 31 to page 4, line 17; and Figs. 1-4. No new matter has been added

Drawings

The drawings have been objected to because the specification recites a "focus 13" in Fig. 1 but the Examiner could not find the element 13 identified in Fig. 1. Applicant had amended Fig. 1 with the Preliminary Amendment dated January 7, 2005 to call out the focus 13. Accordingly, applicant requests withdrawal of this objection.

The Invention

Independent claim 9 recites a laser processing machine for processing workpieces using a laser beam. The laser processing machine includes a telescope for widening and focusing a laser beam. The telescope includes an ellipsoidal mirror having a first axis of rotation and a first surface that lies on an ellipse having two foci, a paraboloidal mirror having a second axis of rotation that is parallel to the first axis of rotation and a second surface that lies on a parabola having a focus that coincides with one of the foci of the ellipse, and a mirror positioned to adjust an optical axis of a laser beam entering the telescope parallel to an optical axis of a laser beam exiting the telescope.

Independent claim 15 recites the telescope substantially as claimed in claim 9.

Claim Rejections Under 35 U.S.C. §102

Claims 9, 10, 12, 14-16, 18, and 20 have been rejected as being allegedly anticipated by U.S. Patent No. 4,518,232 (Dagenais). Applicant requests withdrawal of this rejection because Dagenais fails to describe or suggest a mirror positioned to adjust an optical axis of a laser beam entering a telescope parallel to an optical axis of a laser beam exiting the telescope, as recited in claims 9 and 15.

Dagenais relates to an optical beam shaping apparatus including a planar mirror 11, a paraboloidal mirror 12, and an ellipsoidal multi-faceted mirror 16. See Dagenais at col. 2, line 60 to col. 3, line 29, and Fig. 1. The paraboloidal mirror 12 has a parabolic reflecting surface 13 that is concentric with a center point 14 of the planar mirror 11. See Dagenais at col. 2, lines 61-65 and Fig. 1. The multi-faceted mirror 16 includes flat facets disposed on an ellipsoidal envelope 16 that is open at its center 18 to permit the passage of the incoming laser beam 10 through the mirror 16. An incoming laser beam 10 is reflected by the mirror 11 toward the paraboloidal mirror 12, which divergently reflects the laser beam and forms an imaginary stigmatic image of the laser beam at its focal point. See Dagenais at col. 3, lines 4-11, and Fig. 1. The ellipsoidal multi-faceted mirror 16 receives the expanded laser beam from the paraboloidal mirror 12 and reflects it as a plurality of small portions that are concentric about a center axis 15 to an image plane 19 that lies on a far focal point of the ellipsoidal envelope 16. See Dagenais at col. 3, lines 24-31, and Fig. 1.

Dagenais' mirror 11 is not positioned to adjust an optical axis of the laser beam 10 entering the arrangement parallel to the center axis 15 of the laser beam exiting the arrangement to the image plane 19. Rather, as shown in Fig. 1, the mirror 11 is positioned in a manner in which the optical axis of the laser beam 10 is perpendicular to the center axis 15. Moreover, the only design described that mentions that an optical axis of the laser beam 10 entering the arrangement be parallel to the center axis 15 is a design that does not include the mirror 11. See Dagenais at col. 3, lines 11-17. For at least these reasons, claims 9 and 15, as well as dependent claims 10, 12, 14, 16, 18, and 20, are allowable over Dagenais.

Claim Rejections Under 35 U.S.C. §103

Claims 9-20 have been rejected as being allegedly obvious over U.S. Patent No. 5,574,601 (Hall) in view of U.S. Patent No. 4,568,982 (Follett) and U.S. Patent No. 5,499,667 (Shibazaki). Applicant requests withdrawal of this rejection because Hall, Shibazaki, and Follett fail to describe or suggest a mirror positioned to adjust an optical axis of a laser beam entering a telescope parallel to an optical axis of a laser beam exiting the telescope, as recited in claims 9

and 15, and because one of ordinary skill in the art would not have been motivated to modify Hall in the manner suggested in the Office Action.

In the design shown in Figs. 4 and 5 of Hall, a system is described that transforms a collimated input into a focused output. See Hall at col. 4, lines 4-6, and Figs. 4 and 5. Hall's system includes a concave ellipsoidal surface 19 and a convex paraboloid surface 20 arranged such that collimated incoming rays are reflected divergently by the surface 20 and are focused by the surface 19 onto a non-common focus of the ellipsoidal surface 19. See Hall at col. 4, lines 4-6 and Figs. 4 and 5. However, as conceded in the Office Action, Hall's system does not include a mirror positioned to adjust an optical axis of the collimated incoming rays parallel to an optical axis of the light focused onto the focus of the ellipsoidal surface 19. Rather, as shown in Figs. 4 and 5 of Hall, the collimated light impinges directly onto the paraboloid surface 20 without being adjusted by a mirror and an optical axis of the impinging light is not parallel to an optical axis of the focused output.

Moreover, while the design shown in Fig. 2 of Hall includes a set of plane mirrors 12, 13, these mirrors are used in a beam expander device that does not require the use of an ellipsoidal surface, but does require the use of two paraboloidal surfaces 7 and 8 to cause the beam expansion. There is nothing in Hall or the other cited references that would suggest such a modification to the system Fig. 4.

Realizing these deficiencies, the Office Action cites a mirror 14 in a scanning apparatus of Follett. However, in Follett, the mirror 14, along with mirror 11 and mirror 12 are provided to direct a laser beam onto a surface of an elliptical mirror 15. Follett's mirror 14 is not positioned to adjust an optical axis of a laser beam entering a telescope, but adjusts the laser beam entering a scanning apparatus. Additionally, Follett's mirror 14 is not positioned to adjust the optical axis of the laser beam entering the scanning apparatus parallel to an optical axis of a laser beam exiting the scanning apparatus. Rather, the laser beam entering the scanning apparatus appears to be non-parallel to the laser beam that strikes the drum 16. See Follett at Fig. 1. Moreover, there is nothing in the cited art that would suggest the desirability of placing the mirror 14 of Follett into the system of Fig. 2 of Hall. Follett uses the mirror 14 to direct light only to an

elliptically shaped mirror 15 and does not use the mirror 14 to direct light to an apparatus that includes a paraboloid. For at least this reason, it would not have been obvious to modify Hall's design to include the mirror 14 of Follett.

The Office Action also cites Shibazaki as showing a plane mirror 14 in Fig. 4. However, Shibazaki's mirror 14 is not positioned to adjust an optical axis of a laser beam entering a telescope parallel to an optical axis of a laser beam exiting the telescope, as recited in claims 9 and 15. Instead, in Shibazaki, the mirror 14 is positioned to direct light into a projector, not a telescope. Moreover, the mirror 14 does not adjust an optical axis of the light entering the projector parallel to an optical axis of light exiting the projector. See Shibazaki at col. 5, line 51 to col. 6, lines 11, and Fig. 4. Rather, the light entering the mirror 14 in Shibazaki has an optical axis that is nearly perpendicular to the light exiting the projector.

The Examiner argues (at page 4 of the Office Action) that it "would have been obvious to adapt Hall in view of Follett and Shibazaki to provide this to direct the laser beam into the telescope consisting of (see element 14 in figure 4)." It appears that text was inadvertently omitted from the Office Action and applicant requests that the Examiner provide the missing text. While Follett and Shibazaki use mirrors to direct light, this alone does not provide the requisite motivation to modify Hall to include such a mirror, much less to include a mirror positioned to adjust an optical axis of a laser beam entering a telescope parallel to an optical axis of a laser beam exiting the telescope.

For at least these reasons, claims 9 and 15 are allowable over any proper combination of Hall, Follett, and Shibazaki. Claims 10-14 and 15-20 depend from claims 9 and 15 and are allowable for at least the reasons that claims 9 and 15 are allowable, and for containing allowable subject matter in their own right. For example, claims 11 and 17 recite that the telescope is adapted for movement parallel to the optical axis of the laser beam that enters the telescope without altering an alignment of the laser beam entering the telescope. None of the cited references describes or suggests such parallel movement, and the Office Action does not provide any citations in the cited references that would show such parallel movement.

New Claims

New claims 21-28 depend from claims 9 and 15, and are allowable for at least the reasons that claims 9 and 15 are allowable.

Conclusion

Applicants respectfully request the Examiner to reconsider the pending rejections and allow the pending claims. The fee in the amount of $1,020.00 for the Three Month Extension of Time is being paid concurrently herewith on the Electronic Filing System (EFS) by way of Deposit Account authorization. Please apply all charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

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